Liste erstellt am 2018-12-23

References

Aktuell

Aguisanda 2018

Francis Aguisanda, *At the end of the road, a new start*. science **362** (2018), 1078.

Inever thought my mom's first tour of Stanford University would be of the psychiatric ward. When I arrived in sunny California 2 years earlier to start my Ph.D. studies, I was on top of the world. But that feeling of triumph vanished quickly. The uncertainty that had nagged at me for years grew overwhelming. I loved learning new things and talking about science, yet I couldn't envision working at the bench for the rest of my life. But after building my identity around being a scientist, how could I turn away? Stanford was, in many ways, my Hail Mary. If I was going to be happy, it had to be there—right?

Cinner 2018

Joshua Cinner, *How behavioral science can help conservation*. science **362** (2018), 889–890.

Human behavior is also profoundly influenced by our innate desire for prestige, reputation, conformity, and reciprocity. Social influence refers to the ways in which our decisions and actions are shaped by perceptions (whether accurate or not) of what other people do and what they approve of.

Coelho 2018

Camila H. Coelho, *Finding my inner Wonder Woman*. science **362** (2018), 966.

It was an early blow to my self-confidence. I was attending my first group meeting in the lab where I had just started as a postdoc, and I was pleased that I had managed to follow most of the discussion. Then, in front of everyone, my supervisor turned to me and asked about my previous accomplishments. I froze. As a Ph.D. student, I had achieved lots to be proud of. But all of that was in my home country of Brazil. Now I was in Washington, D.C.—and I didn't know what the word "accomplishment" meant. When I looked it up later in my English-Portuguese dictionary, I realized what I should have said: presenting my research at international conferences, publishing, teaching, and more. But at the time, all I could utter in response was "I don't know."

Manson 2018

JoAnn E. Manson et al., *Vitamin D Supplements and Prevention of Cancer and Cardiovascular Disease*. New England Journal of Medicine (2018), preprint, 1–12. DOI:10.1056/NEJMoa1809944.

JoAnn E. Manson, Nancy R. Cook, I-Min Lee, William Christen, Shari S. Bassuk, Samia Mora, Heike Gibson, David Gordon, Trisha Copeland, Denise D'Agostino, Georgina Friedenberg, Claire Ridge, Vadim Bubes, Edward L. Giovannucci, Walter C. Willett, and Julie E. Buring, for the Vital Research Group

Background: It is unclear whether supplementation with vitamin D reduces the risk of cancer or cardiovascular disease, and data from randomized trials are limited.

Methods: We conducted a nationwide, randomized, placebo-controlled trial, with a two-by-two factorial design, of vitamin D3 (cholecalciferol) at a dose of 2000 IU per day and marine n-3 (also called omega-3) fatty acids at a dose of 1 g per day for the prevention of cancer and cardiovascular disease among men 50 years of age or older and women 55 years of age or older in the United States. Primary end points were invasive cancer of any type and major cardiovascular events (a composite of myocardial infarction, stroke, or death from cardiovascular causes). Secondary end points included site-specific cancers, death from cancer, and additional cardiovascular events. This article reports the results of the comparison of vitamin D with placebo.

Results: A total of 25,871 participants, including 5106 black participants, underwent randomization. Supplementation with vitamin D was not associated with a lower risk of either of the primary end points. During a median follow-up of 5.3 years, cancer was diagnosed in 1617 participants (793 in the vitamin D group and 824 in the placebo group; hazard ratio, 0.96; 95 % confidence interval [CI], 0.88 to 1.06; P = 0.47). A major cardiovascular event occurred in 805 participants (396 in the vitamin D group and 409 in the placebo group; hazard ratio, 0.97; 95 % CI, 0.85 to 1.12; P = 0.69). In the analyses of secondary end points, the hazard ratios were as follows: for death from cancer (341 deaths), 0.83 (95 % CI, 0.67 to 1.02); for breast cancer, 1.02 (95 % CI, 0.79 to 1.31); for prostate cancer, 0.88 (95 % CI, 0.72 to 1.07); for colorectal cancer, 1.09 (95 % CI, 0.73 to 1.62); for the expanded composite end point of major cardiovascular events plus coronary revascularization, 0.96 (95 % CI, 0.86 to 1.08); for myocardial infarction, 0.96 (95 % CI, 0.78 to 1.19); for stroke, 0.95 (95 % CI, 0.76 to 1.20); and for death from cardiovascular causes, 1.11 (95 % CI, 0.88 to 1.40). In the analysis of death from any cause (978 deaths), the hazard ratio was 0.99 (95 % CI, 0.87 to 1.12). No excess risks of hypercalcemia or other adverse events were identified.

Conclusions: Supplementation with vitamin D did not result in a lower incidence of invasive cancer or cardiovascular events than placebo.

Manson 2018

JoAnn E. Manson et al., *Marine n-3 Fatty Acids and Prevention of Cardiovascular Disease and Cancer*. New England Journal of Medicine (2018), preprint, 1–10. DOI:10.1056/NEJMoa1811403.

JoAnn E. Manson, Nancy R. Cook, I-Min Lee, William Christen, Shari S. Bassuk, Samia Mora, Heike Gibson, Christine M. Albert, David Gordon, Trisha Copeland, Denise D'Agostino, Georgina Friedenberg, Claire Ridge, Vadim Bubes, Edward L. Giovannucci, Walter C. Willett, and Julie E. Buring, for the Vital Research Group

Background: Higher intake of marine n-3 (also called omega-3) fatty acids has been associated with reduced risks of cardiovascular disease and cancer in several observational studies. Whether supplementation with n-3 fatty acids has such effects in general populations at usual risk for these end points is unclear.

Methods: We conducted a randomized, placebo-controlled trial, with a two-by-two factorial design, of vitamin D3 (at a dose of 2000 IU per day) and marine n-3 fatty acids (at a dose of 1 g per day) in the primary prevention of cardiovascular disease and cancer among men 50 years of age or older and women 55 years of age or older in the United States. Primary end points were major cardiovascular events (a composite of myocardial infarction, stroke, or death from cardiovascular causes) and invasive cancer of any type. Secondary end points included individual components of the composite cardiovascular end point, the composite end point plus coronary revascularization (expanded composite of cardiovascular events),

site-specific cancers, and death from cancer. Safety was also assessed. This article reports the results of the comparison of n-3 fatty acids with placebo.

Results: A total of 25,871 participants, including 5106 black participants, underwent randomization. During a median follow-up of 5.3 years, a major cardiovascular event occurred in 386 participants in the n-3 group and in 419 in the placebo group (hazard ratio, 0.92; 95 % confidence interval [CI], 0.80 to 1.06; P = 0.24). Invasive cancer was diagnosed in 820 participants in the n-3 group and in 797 in the placebo group (hazard ratio, 1.03; 95 % CI, 0.93 to 1.13; P = 0.56). In the analyses of key secondary end points, the hazard ratios were as follows: for the expanded composite end point of cardiovascular events, 0.93 (95 % CI, 0.82 to 1.04); for total myocardial infarction, 0.72 (95 % CI, 0.59 to 0.90); for total stroke, 1.04 (95 % CI, 0.83 to 1.31); for death from cardiovascular causes, 0.96 (95 % CI, 0.76 to 1.21); and for death from cancer (341 deaths from cancer), 0.97 (95 % CI, 0.79 to 1.20). In the analysis of death from any cause (978 deaths overall), the hazard ratio was 1.02 (95 % CI, 0.90 to 1.15). No excess risks of bleeding or other serious adverse events were observed.

Conclusions: Supplementation with n-3 fatty acids did not result in a lower incidence of major cardiovascular events or cancer than placebo.

Zittrain 2018

Jonathan Zittrain, *Fixing the internet*. science **362** (2018), 871.

Many people are not really using the web at all, but rather flitting among a small handful of totalizing apps like Facebook and Google.

Anthropologie

Bardo 2018

Ameline Bardo, Laurent Vigouroux, Tracy L. Kivell & Emmanuelle Pouydebat, *The impact of hand proportions on tool grip abilities in humans, great apes and fossil hominins, A biomechanical analysis using musculoskeletal simulation*. Journal of Human Evolution **125** (2018), 106–121.

Differences in grip techniques used across primates are usually attributed to variation in thumb-finger proportions and muscular anatomy of the hand. However, this cause-effect relationship is not fully understood because little is known about the biomechanical functioning and mechanical loads (e.g., muscle or joint forces) of the non-human primate hand compared to that of humans during object manipulation. This study aims to understand the importance of hand proportions on the use of different grip strategies used by humans, extant great apes (bonobos, gorillas and orangutans) and, potentially, fossil hominins (Homo naledi and Australopithecus sediba) using a musculoskeletal model of the hand. Results show that certain grips are more challenging for some species, particularly orangutans, than others, such that they require stronger muscle forces for a given range of motion. Assuming a human-like range of motion at each hand joint, simulation results show that H. naledi and A. sediba had the biomechanical potential to use the grip techniques considered important for stone tool-related behaviors in humans. These musculoskeletal simulation results shed light on the functional consequences of the different hand proportions among extant and extinct hominids and the different manipulative abilities found in humans and great apes.

Keywords: Hominoids | Australopithecus | Homo | Great apes | Manipulation | Dexterity

Geary 2018

David C. Geary, *Autism in the broader context of cognitive sex differences*. PNAS **115** (2018), 12089–12091.

The key point is that there are reliably documented sex differences for many brain, cognitive, and behavioral traits, and these will likely prove to be useful in the study of various neurological and other disorders, including autism, as proposed by Baron-Cohen et al.

Greenberg 2018

David M. Greenberg, Varun Warrier, Carrie Allison & Simon Baron-Cohen, *Testing the Empathizing–Systemizing theory of sex differences and the Extreme Male Brain theory of autism in half a million people*. PNAS **115** (2018), 12152–12157.

pnas115-12152-Supplement.pdf

The Empathizing–Systemizing (E-S) theory of typical sex differences suggests that individuals may be classified based on empathy and systemizing. An extension of the E-S theory, the Extreme Male Brain (EMB) theory suggests that autistic people on average have a shift towards a more masculinized brain along the E-S dimensions. Both theories have been investigated in small sample sizes, limiting their generalizability. Here we leverage two large datasets (discovery n = 671,606, including 36,648 autistic individuals primarily; and validation n = 14,354, including 226 autistic individuals) to investigate 10 predictions of the E-S and the EMB theories. In the discovery dataset, typical females on average showed higher scores on short forms of the Empathy Quotient (EQ) and Sensory Perception Quotient (SPQ), and typical males on average showed higher scores on short forms of the Autism Spectrum Quotient (AQ) and Systemizing Quotient (SQ). Typical sex differences in these measures were attenuated in autistic individuals. Analysis of "brain types" revealed that typical females on average were more likely to be Type E (EQ > SQ) or Extreme Type E and that typical males on average were more likely to be Type S (SQ > EQ) or Extreme Type S. In both datasets, autistic individuals, regardless of their reported sex, on average were "masculinized." Finally, we demonstrate that D-scores (difference between EQ and SQ) account for 19 times more of the variance in autistic traits (43 %) than do other demographic variables including sex. Our results provide robust evidence in support of both the E-S and EMB theories.

Keywords: autism | sex differences | empathy | systemizing | big data

Significance: In the largest study to date of autistic traits, we test 10 predictions from the Empathizing–Systemizing (E-S) theory of sex differences and the Extreme Male Brain (EMB) theory of autism. We confirmed that typical females on average are more empathic, typical males on average are more systems-oriented, and autistic people on average show a "masculinized" profile. The strengths of the study are the inclusion of a replication sample and the use of big data. These two theories can be considered to have strong support. We demonstrate that D-scores (difference between E and S) account for 19 times the variance in autistic traits than do other demographic variables, including sex, underscoring the importance of brain types in autism.

Kamberov 2018

Yana G. Kamberov et al., *Comparative evidence for the independent evolution of hair and sweat gland traits in primates*. Journal of Human Evolution **125** (2018), 99–105.

Yana G. Kamberov, Samantha M. Guhan, Alessandra DeMarchis, Judy Jiang, Sara Sherwood Wright, Bruce A. Morgan, Pardis C. Sabeti, Clifford J. Tabin & Daniel E. Lieberman

Humans differ in many respects from other primates, but perhaps no derived human feature is more striking than our naked skin. Long purported to be adaptive, humans' unique external appearance is characterized by changes in both the patterning of hair follicles and eccrine sweat glands, producing decreased hair cover and increased sweat gland density. Despite the conspicuousness of these features and their potential evolutionary importance, there is a lack of clarity regarding how they evolved within the primate lineage. We thus collected and quantified the density of hair follicles and eccrine sweat glands from five regions of the skin in three species of primates: macaque, chimpanzee and human. Although human hair cover is greatly attenuated relative to that of our close relatives, we find that humans have a chimpanzee-like hair density that is significantly lower than that of macaques. In contrast, eccrine gland density is on average 10-fold higher in humans compared to chimpanzees and macaques, whose density is strikingly similar. Our findings suggest that a decrease in hair density in the ancestors of humans and apes was followed by an increase in eccrine gland density and a reduction in fur cover in humans. This work answers long-standing questions about the traits that make human skin unique and substantiates a model in which the evolution of expanded eccrine gland density was exclusive to the human lineage.

Keywords: Skin | Human evolution | Sweat gland | Hair | Eccrine gland | Ectodermal appendage

Key 2018

Alastair Key, Stephen R. Merritt & Tracy L. Kivell, *Hand grip diversity and frequency during the use of Lower Palaeolithic stone cutting-tools.* Journal of Human Evolution **125** (2018), 137–158.

The suite of anatomical features contributing to the unique gripping capabilities of the modern human hand evolved alongside the proliferation of Lower Palaeolithic flaked tool technologies across the Old World. Experimental studies investigating their potential co-evolution suggest that the use of flakes, handaxes, and other stone tools is facilitated by manipulative capabilities consistent with the evolutionary trajectory of the hominin hand during this period. Grip analyses have provided important contributions to this understanding. To date, however, there has been no large-scale investigation of grip diversity during flaked stone-tool use, empirical comparative analyses of grip use frequencies, or examination of ergonomic relationships between grip choice and stone tool type and form. Here, we conduct four experimental studies, using replica Lower Palaeolithic stone tools in a series of actualistic and laboratory-based contexts, to record grip type and frequency of grip use during 1067 stone tool-use events by 123 individuals. Using detailed morphometric data recorded from each tool, we demonstrate how grip choice varies according to the type and form of stone tool used, and how these relationships differ between tool-use contexts. We identify 29 grip types across all tool-use events, with significant differences recorded in their frequency of use dependent on tool type, tool form, and the context of use. Despite the influence of these three factors, there is consistency in the frequent use of a limited number (≤ 4) of grip types within each experiment and the consistent and seemingly forceful recruitment of the thumb and index finger. Accordingly, we argue that there are deep-rooted, ergonomicallyrelated, regularities in how stone tools are gripped during their use, that these regularities may have been present during the use of stone tools by Plio-Pleistocene hominins, and any subsequent selective pressures would likely have been focused on the first and second digit.

Keywords: Manipulation | Stone tool variation | Flake | Handaxe | Hominin | Hand evolution

Ogihara 2018

Naomichi Ogihara, Eishi Hirasaki, Emanuel Andrada & Reinhard Blickhan, *Bipedal gait versatility in the Japanese macaque (Macaca fuscata)*. Journal of Human Evolution **125** (2018), 2–14.

It was previously believed that, among primates, only humans run bipedally. However, there is now growing evidence that at least some non-human primates can not only run bipedally but can also generate a running gait with an aerial phase. Japanese macaques trained for bipedal performances have been known to exhibit remarkable bipedal locomotion capabilities, but no aerial-phase running has previously been reported. In the present study, we investigated whether Japanese macaques could run with an aerial phase by collecting bipedal gait sequences from three macaques on a level surface at selfselected speeds (n = 188). During our experiments, body kinematics and ground reaction forces were recorded by a motion-capture system and two force plates installed within a wooden walkway. Our Results demonstrated that macaques were able to utilize a variety of bipedal gaits including grounded running, skipping, and even running with an aerial phase. The self-selected bipedal locomotion speed of the macaques was fast, with Froude speed ranging from 0.4 to 1.3. However, based on congruity, no single trial that could be categorized as a pendulum-like walking gait was observed. The parameters describing the temporal, kinematic, and dynamic characteristics of macaque bipedal running gaits follow the patterns previously documented for other non-human primates and terrestrial birds that use running gaits, but are different from those of humans and from birds' walking gaits. The present study confirmed that when a Japanese macaque engages in bipedal locomotion, even without an aerial phase, it generally utilizes a spring-like running mechanism because the animals have a limited ability to stiffen their legs. That limitation is due to anatomical restrictions determined by the morphology and structure of the macaque musculoskeletal system. The general adoption of grounded running in macaques and other non-human primates, along with its absence in human bipedal locomotion, suggests that abandonment of compliant gait was a critical transition in the evolution of human obligatory bipedalism.

Keywords: Macaque | Grounded running | Skipping | Running

Thompson 2018

Nathan E. Thompson, Danielle Rubinstein & Susan G. Larson, *Great ape thorax and shoulder configurationd, An adaptation for arboreality or knuckle-walking?* Journal of Human Evolution **125** (2018), 15–26.

Great apes exhibit a suite of morphological traits of the shoulder and upper thorax that have traditionally been linked to orthograde arborealism. Recently it has been proposed that these traits are instead adaptations for knuckle-walking, and more broadly, that knuckle-walking itself is an adaptation for shock absorption during terrestriality. Here we test several tenets of these hypotheses using kinematic and kinetic data from chimpanzees and macaques, and electromyographic data of shoulder muscle activity in chimpanzees. We collected 3D kinematic data to quantify motion of the acromion and trunk during quadrupedalism and vertical climbing in chimpanzees as well as ground reaction forces to investigate the presence and magnitude of impact transient forces during terrestrial locomotion in chimpanzees and macaques. We also investigated patterns of recruitment of select forelimb musculature (triceps brachii and serratus anterior) using previously collected data in chimpanzees to determine whether these muscles may function

to absorb impact transient forces. We found that the acromion is significantly more elevated in vertical climbing than during knuckle-walking, while dorsoventral ranges and magnitudes of motion were similar between gaits. Ground reaction forces indicate that only a minority of strides in either chimpanzees or macaques have transient forces and, when present, these transient forces as well as loading rates are small. Electromyographic results show that activity of the triceps brachii may facilitate energy absorption while serratus anterior likely functions to support the trunk, as in other primates. Our data suggest there is little to no evidence supporting recent hypotheses that the African ape upper thorax and shoulder configuration is an adaptation for knuckle-walking, or more broadly, that knuckle-walking exists as an adaptation to absorb impact shock during terrestriality. We do however find some evidence that shoulder configuration allows greater scapular elevation in chimpanzees during arboreal behaviors (e.g., vertical climbing).

Keywords: Locomotion | Kinematic | Kinetic | Chimpanzee | Electromyography | Vertical climbing

Thompson 2018

Nathan E. Thompson, Matthew C. O'Neill, Nicholas B. Holowka & Brigitte Demes, *Step width and frontal plane trunk motion in bipedal chimpanzee and human walking*. Journal of Human Evolution **125** (2018), 27–37.

Human bipedalism is characterized by mediolateral oscillations of the center of mass (CoM) between the feet. The preferred step widths and CoM oscillations used by humans likely represent a trade-off of several factors (e.g., stance and swing phase costs). However, it is difficult to assess whether human frontal plane control strategies are unique given few detailed data on frontal plane motion during facultative bipedalism in apes. Here, we collected three-dimensional kinematic and kinetic data in humans and chimpanzees to investigate the relationship between step width, mediolateral CoM motion, frontal plane trunk kinematics, and CoM power during bipedalism. Chimpanzee bipedalism entails mediolateral CoM oscillations and step widths that are (scaled to lower/hind limb length) three times larger than those of humans. Chimpanzees use a combination of linear and angular motion of the trunk and list the entire trunk, and especially thorax, over the stance side foot, generating large mediolateral shifts in the CoM, whereas humans utilize little angular motion within the trunk. Larger mediolateral CoM motions do not have a significant effect on CoM power. Similarities between bipedal chimpanzees and other bipedal non-human primates (macaques and gibbons) indicate that narrow CoM motions are unique to humans and are likely due to our adducted hips and valgus knees. Valgus knees appear early in the human fossil record (≈3.6 Ma), contemporaneous with the Laetoli footprints. However, fossils attributed to Ardipithecus ramidus (≈4.4 Ma) suggest that the earliest hominins may have lacked a hominin-like degree of knee valgus. If correct, this suggests that this species may have used wide steps, larger mediolateral CoM motions, and perhaps larger trunk motions during bipedal walking. Finally, we present a novel means to estimate mediolateral CoM motion from trackway step width, and estimate that the Laetoli G track maker used CoM motions within the human range.

Keywords: Bipedalism | Locomotion | Hominin | Center of mass | Ardipithecus | Laetoli footprints

Bibel

Finkelstein 2008

Israel Finkelstein, *Jerusalem in the Persian (and Early Hellenistic)*

Period and the Wall of Nehemiah. Journal for the Study of the Old Testament **32** (2008), iv, 501–520.

Knowledge of the archaeology of Jerusalem in the Persian (and Early Hellenistic) period—the size of the settlement and whether it was fortified—is crucial to understanding the history of the province of Yehud, the reality behind the book of Nehemiah and the process of compilation and redaction of certain biblical texts. It is therefore essential to look at the finds free of preconceptions (which may stem from the account in the book of Nehemiah) and only then attempt to merge archaeology and text.

Keywords: book of Nehemiah | Nehemiah | archaeology of Jerusalem | Yehud | Persian period | Hasmoneans.

The Persian-period finds in Jerusalem and the search for Nehemiah's wall are additional cases in which archaeologists have given up archaeology in favor of an uncritical reading of the biblical text. The dearth of archaeological finds and the lack of extra-biblical texts on Persian-period Yehud open the way to circular reasoning in reconstructing the history of this period.

The finds indicate that in the Persian and Early Hellenistic periods Jerusalem was a small unfortified village that stretched over an area of c. 20 dunams, with a population of a few hundred people—that is, not much more than 100 adult men. This population—and the depleted population of the Jerusalem countryside in particular and the entire territory of Yehud in general—could not have supported a major reconstruction effort of the ruined Iron II fortifications of the city. In addition, there is no archaeological evidence whatsoever for any reconstruction or renovation of fortifications in the Persian period. Taking these data into consideration, there are three ways to explain Nehemiah 3: (1) that it is a utopian list; (2) that it preserves a memory of an Iron Age construction or renovation of the city-wall; (3) that the list is influenced by the construction of the First Wall in the Hasmonean period. All three options pose significant difficulties—the first two more than the third. In any event, the archaeology of Jerusalem in the Persian period—as presented above—must be the starting point for any future discussion.

On a broader issue, the archaeological evidence from Jerusalem casts severe doubt on the notion that much of the biblical material was composed in the Persian and Early Hellenistic periods. But this crucial issue is beyond the scope of this study and will be discussed elsewhere.

Kosmin 2016

Paul Kosmin, *Indigenous Revolts in 2 Maccabees*, *The Persian Version*. Classical Philology **111** (2016), 32–53.

This article has argued that the Second Epistle and the ninth chapter of 2 Maccabees deliberately present the interactions between Antiochus IV and the population of Persis as a typological and chronological parallel to Seleucid aggression and the Maccabaean uprising in Judea. The narratives are carefully crafted to explore the full significance of this synchronism while never undermining the uniqueness and ultimate historical agency of the Jewish God. Furthermore, reading the Persian accounts in 2 Maccabees against the textual and material evidence from second-century Persis suggests that the provinces should not be considered in isolation from one another. The narration of Persian events in 2 Maccabees implies basic Jewish knowledge of developments in the region; this is hardly surprising given the existence of Jewish communities in Babylonia, Media, and Elymas. Lateral connections between Seleucid provinces were no doubt common and we should not underestimate the extent to which hostile indigenous responses to Seleucid monarchy may have been inspired and encouraged by rumor of each other's successes:100 report of Jewish victories would have reached the indigenous popula-

tions of Media and Persia as quickly as they were announced to Antiochus IV at Ecbatana. The provinces of the Seleucid empire were not walled gardens. More broadly, while we must of course acknowledge the specificity of localized experiences within the Seleucid empire—and we have no evidence from Persia to match the heady convergence of Ptolemaic-Seleucid rivalry, priestly competition, and cultural aggression in Judea—the 2 Maccabees' Persian narratives (and the independent evidence from Persis) caution against overemphasizing the distinctiveness of the Jewish reaction to Seleucid imperialism.101 The author(s) of 2 Maccabees seem to acknowledge this. In this way, Jerusalem and Persepolis in 164 may function analogously to, say, the Roman destruction of Carthage and Corinth in 146, uniting the western and eastern hemispheres of the Seleucid empire in a single historical moment: temple attack, local revolt, Seleucid defeat.

Biologie

Danchin 2018

Etienne Danchin et al., *Cultural flies: Conformist social learning in fruitflies predicts long-lasting mate-choice traditions.* science **362** (2018), 1025–1030.

s362-1025-Supplement.pdf

Etienne Danchin, Sabine Nöbel, Arnaud Pocheville, Anne-Cecile Dagaeff, Léa Demay, Mathilde Alphand, Sarah Ranty-Roby, Lara van Renssen, Magdalena Monier, Eva Gazagne, Mélanie Allain & Guillaume Isabel

Despite theoretical justification for the evolution of animal culture, empirical evidence for it beyond mammals and birds remains scant, and we still know little about the process of cultural inheritance. In this study, we propose a mechanism-driven definition of animal culture and test it in the fruitfly. We found that fruitflies have five cognitive capacities that enable them to transmit mating preferences culturally across generations, potentially fostering persistent traditions (the main marker of culture) in mating preference. A transmission chain experiment validates a model of the emergence of local traditions, indicating that such social transmission may lead initially neutral traits to become adaptive, hence strongly selecting for copying and conformity. Although this situation was suggested decades ago, it previously had little empirical support.

Lindgren 2018

Johan Lindgren et al., *Soft-tissue evidence for homeothermy and crypsis in a Jurassic ichthyosaur.* nature **564** (2018), 359–365.

n564-0359-Supplement.pdf

Johan Lindgren, Peter Sjövall, Volker Thiel, Wenxia Zheng, Shosuke Ito, Kazumasa Wakamatsu, Rolf Hauff, Benjamin P. Kear, Anders Engdahl, Carl Alwmark, Mats E. Eriksson, Martin Jarenmark, Sven Sachs, Per E. Ahlberg, Federica Marone, Takeo Kuriyama, Ola Gustafsson, Per Malmberg, Aurélien Thomen, Irene Rodríguez-Meizoso, Per Uvdal, Makoto Ojika & Mary H. Schweitzer

Ichthyosaurs are extinct marine reptiles that display a notable external similarity to modern toothed whales. Here we show that this resemblance is more than skin deep. We apply a multidisciplinary experimental approach to characterize the cellular and molecular composition of integumental tissues in an exceptionally preserved specimen of the Early Jurassic ichthyosaur Stenopterygius. Our analyses recovered still-flexible remnants of the original scaleless skin, which comprises morphologically distinct epidermal and dermal layers. These are underlain by insulating blubber that would have augmented streamlining, buoyancy and

homeothermy. Additionally, we identify endogenous proteinaceous and lipid constituents, together with keratinocytes and branched melanophores that contain eumelanin pigment. Distributional variation of melanophores across the body suggests countershading, possibly enhanced by physiological adjustments of colour to enable photoprotection, concealment and/or thermoregulation. Convergence of ichthyosaurs with extant marine amniotes thus extends to the ultrastructural and molecular levels, reflecting the omnipresent constraints of their shared adaptation to pelagic life.

Pennisi 2018

Elizabeth Pennisi, *Buying Time*. science **362** (2018), 988–991.

In a fast-changing environment, evolution can be too slow. "Plasticity" can give it a chance to catch up.

To some, such findings evoke the spirit of the French naturalist Jean-Baptiste Lamarck. Decades before Charles Darwin laid out his evolutionary theory in On the Origin of Species, Lamarck and other biologists proposed their own mechanisms for evolutionary change. Among his ideas, Lamarck famously asserted in the early 1800s that organisms can acquire a new trait in their lifetime—longer necks for giraffes reaching for food; webbed feet for water birds—and pass it on to their offspring. Later, biologists cast aside Lamarckism, as the classic view of evolution emerged: that organisms evolve as a result of natural selection acting on random genetic changes. Now, however, evolutionary biologists have shown in multiple organisms, including lizards, roundworms, and yeast, that a plastic response can pave the way for permanent adaptations. The new evidence, much of it reported at the Second Joint Congress on Evolutionary Biology here this summer, shows the connection between plasticity and evolution "is a real thing," says Carl Schlichting, an evolutionary biologist at the University of Connecticut in Storrs. "If you look for it, you are going to find it."

Whiten 2018

Andrew Whiten, *Culture and conformity shape fruitfly mating*. science **362** (2018), 998–999.

Potent social learning sustains the inheritance of mating preferences over generations.

They show that the mating preferences of female fruitflies are strongly influenced by the existing preferences they observe in other females, generating traditions that are repeatedly passed on to others and spread in the population. Animal culture may be a much more widespread phenomenon than hitherto acknowledged.

Datierung

Aubert 2018

Maxime Aubert, Adam Brumm & Jillian Huntley, *Early dates for 'Neanderthal cave art' may be wrong*. Journal of Human Evolution **125** (2018), 215–217.

Neanderthals could have made rock art of some kind but owing to sampling problems, in particular, we do not believe that this has been sufficiently demonstrated by Hoffmann et al.'s (2018a) study.

Keywords: Cave art | Neanderthal | Uranium-series dating

Energie

ZAPPA 2019

William Zappa, Martin Junginger & Machteld van den Broek, *Is a 100 % renewable European power system feasible by 2050?* Applied Energy **233** (2019), 1027–1050.

Highlights:
- Seven scenarios for a 100 % renewable European power system are modelled for 2050.
- A 100 % renewable system could operate with the same level of adequacy as today.
- Mass mobilisation of Europe¡[a]s solid biomass and biogas resources would be required.
- 90 % more generation and 240 % more transmission capacity would be needed than today.
- Costs would be ≈530 billion euro per year, 30 % more than a system with nuclear or CCS.

In this study, we model seven scenarios for the European power system in 2050 based on 100 % renewable energy sources, assuming different levels of future demand and technology availability, and compare them with a scenario which includes low-carbon non-renewable technologies. We find that a 100 % renewable European power system could operate with the same level of system adequacy as today when relying on European resources alone, even in the most challenging weather year observed in the period from 1979 to 2015. However, based on our scenario results, realising such a system by 2050 would require: (i) a 90 % increase in generation capacity to at least 1.9 TW (compared with 1 TW installed today), (ii) reliable cross-border transmission capacity at least 140GW higher than current levels (60 GW), (iii) the well-managed integration of heat pumps and electric vehicles into the power system to reduce demand peaks and biogas requirements, (iv) the implementation of energy efficiency measures to avoid even larger increases in required biomass demand, generation and transmission capacity, (v) wind deployment levels of 7.5GWy1 (currently 10.6GWy1) to be maintained, while solar photovoltaic deployment to increase to at least 15GWy1 (currently 10.5GWy1), (vi) large-scale mobilisation of Europe's biomass resources, with power sector biomass consumption reaching at least 8.5 EJ in the most challenging year (compared with 1.9 EJ today), and (vii) increasing solid biomass and biogas capacity deployment to at least 4GWy1 and 6 GWy1 respectively. We find that even when wind and solar photovoltaic capacity is installed in optimum locations, the total cost of a 100 % renewable power system (≈530 bn y1) would be approximately 30 % higher than a power system which includes other low-carbon technologies such as nuclear, or carbon capture and storage (≈410 bn y1). Furthermore, a 100 % renewable system may not deliver the level of emission reductions necessary to achieve Europe's climate goals by 2050, as negative emissions from biomass with carbon capture and storage may still be required to offset an increase in indirect emissions, or to realise more ambitious decarbonisation pathways.

Keywords: Renewable energy | Power system | System adequacy | Biomass | Solar photovoltaic | Transmission

Grabung

LAWLER 2018

Andrew Lawler, *Migrants and trade spiced up Canaanite metropolis.* science **362** (2018), 980–981.

In Bronze Age tombs, signs of vanilla, 3000 years early, and elaborate medical care.

In two Bronze Age tombs, archaeologists are finding signs that, nearly 3500 years ago, Megiddo was a surprisingly cosmopolitan place. It drew immigrants from what is now Armenia, imported exotic spices from tropical climes, and boasted a state-of-the-art health care system—at least for the elite. At last week's annual meeting of the American Schools of Oriental Research here, Israeli and U.S. researchers laid out the first Results from the tombs, which were discovered in 2016 and date from when Megiddo was a major metropolis of the Canaanites, the ancient inhabitants of present-day Israel and Lebanon.

Jungpaläolithikum

d'Errico 2018

Francesco d'Errico et al., *The origin and evolution of sewing technologies in Eurasia and North America*. Journal of Human Evolution **125** (2018), 71–86.

Francesco d'Errico, Luc Doyon, Shuangquan Zhang, Malvina Baumann, Martina Lázničková-Galetová, Xing Gao, Fuyou Chen & Yue Zhang

When, how, and following which paths hominins created the innovations that allowed them to colonize regions of the planet that were not suited to their thermal physiology is still a matter of inquiry. In this paper, we elaborate a theoretical framework to investigate the origin and diversification of bone needles, summarize the evidence for their emergence, create a large database of their morphometric and stylistic characters, and present results of the study of an exceptionally well-preserved collection of needles from Shuidonggou Locality 12 (SDG12), a site located in the Ningxia Hui Autonomous Region, Northern China, dated to ca. 11.2 ka BP. Bone needles are reported from 271 sites and 355 archaeological layers. Revision of the evidence shows they represent an original cultural innovation that emerged in Eurasia between 45–40 ka BP. Size differences between the earliest known specimens, found in Siberia and China, indicate needles may have been invented independently in these two regions. Needles from Eastern Europe may represent either an independent invention or a geographic extension of earlier Siberian and Caucasian sewing traditions. In Western Europe, needles appear during the Solutrean. The wider size range characteristic of Magdalenian specimens supports the idea that needles of different sizes were used in a variety of tasks. In China, the robust sub-circular needles found at sites dated between 35–25 ka BP are followed, between 26–23 ka BP, by small flat needles, which may represent an innovation associated with the microblades/microcores toolkit. At SDG12, technological, functional, and morphometric analyses of finished needles and manufacturing by-products identify two previously undetected reduction sequences for the production of needles of different size and, probably, function. The bone needles found at Paleoindian sites are the smallest and reflect a never previously achieved mastery in the production of such tools.

Keywords: Cold adaptation | Needles | Upper Paleolithic | Magdalenian | Paleoindian | China

Klima

Bobe 2018

René Bobe & Susana Carvalho, *The decline of Africa's largest mammals*. science **362** (2018), 892–893.

Faith 2018

J. Tyler Faith, John Rowan, Andrew Du & Paul L. Koch, *Plio-Pleistocene decline of African megaherbivores, No evidence for ancient hominin impacts*. science **362** (2018), 938–941.

s362-0938-Supplement.pdf

It has long been proposed that pre-modern hominin impacts drove extinctions and shaped the evolutionary history of Africa's exceptionally diverse large mammal communities, but this hypothesis has yet to be rigorously tested. We analyzed eastern African herbivore communities spanning the past 7 million years—encompassing the entirety of hominin evolutionary history—to test the hypothesis that top-down impacts of tool-bearing, meat-eating hominins contributed to the demise of megaherbivores prior to the emergence of Homo sapiens. We document a steady, long-term decline of megaherbivores beginning ≈4.6 million years ago, long before the appearance of hominin species capable of exerting top-down control of large mammal communities and predating evidence for hominin interactions with megaherbivore prey. Expansion of C4 grasslands can account for the loss of megaherbivore diversity.

Piecuch 2018

Christopher G. Piecuch et al., *Origin of spatial variation in US East Coast sea-level trends during 1900–2017*. nature **564** (2018), 400–404.

n564-0400-Supplement.pdf

Christopher G. Piecuch, Peter Huybers, Carling C. Hay, Andrew C. Kemp, Christopher M. Little, Jerry X. Mitrovica, Rui M. Ponte & Martin P. Tingley

Identifying the causes of historical trends in relative sea level—the height of the sea surface relative to Earth's crust—is a prerequisite for predicting future changes. Rates of change along the eastern coast of the USA (the US East Coast) during the past century were spatially variable, and relative sea level rose faster along the MidAtlantic Bight than along the South Atlantic Bight and the Gulf of Maine. Past studies suggest that Earth's ongoing response to the last deglaciation1–5, surface redistribution of ice and water5–9 and changes in ocean circulation9–13 contributed considerably to this large-scale spatial pattern. Here we analyse instrumental data14,15 and proxy reconstructions4,12 using probabilistic methods16–18 to show that vertical motions of Earth's crust exerted the dominant control on regional spatial differences in relative sea-level trends along the US East Coast during 1900–2017, explaining most of the large-scale spatial variance. Rates of coastal subsidence caused by ongoing relaxation of the peripheral forebulge associated with the last deglaciation are strongest near North Carolina, Maryland and Virginia. Such structure indicates that Earth's elastic lithosphere is thicker than has been assumed in other models19–22. We also find a substantial coastal gradient in relative sea-level trends over this period that is unrelated to deglaciation and suggests contributions from twentieth-century redistribution of ice and water. Our results indicate that the majority of large-scale spatial variation in longterm rates of relative sea-level rise on the US East Coast is due to geological processes that will persist at similar rates for centuries.

Tollefson 2018

Jeff Tollefson, *Southern Ocean spotted burping CO_2*. nature **564** (2018), 311–312.

Ocean-float data reveal that waters off Antarctica don't absorb as much carbon as scientists thought.

Ostasien

Jeong 2018

Choongwon Jeong et al., *Bronze Age population dynamics and the rise of dairy pastoralism on the eastern Eurasian steppe*. PNAS **115** (2018), E11248–E11255.

pnas115-E11248-Supplement.pdf

Choongwon Jeong, Shevan Wilkin, Tsend Amgalantugs, Abigail S. Bouwman, William Timothy Treal Taylor, Richard W. Hagan, Sabri Bromage, Soninkhishig Tsolmon, Christian Trachsel, Jonas Grossmann, Judith Littleton, Cheryl A. Makarewicz, John Krigbaum, Marta Burri, Ashley Scott, Ganmaa Davaasambuu, Joshua Wright, Franziska Irmer, Erdene Myagmar, Nicole Boivin, Martine Robbeets, Frank J. Rühli, Johannes Krause, Bruno Frohlich, Jessica Hendy & Christina Warinner

Recent paleogenomic studies have shown that migrations of Western steppe herders (WSH) beginning in the Eneolithic (ca. 3300–2700 BCE) profoundly transformed the genes and cultures of Europe and central Asia. Compared with Europe, however, the eastern extent of this WSH expansion is not well defined. Here we present genomic and proteomic data from 22 directly dated Late Bronze Age burials putatively associated with early pastoralism in northern Mongolia (ca. 1380–975 BCE). Genome-wide analysis reveals that they are largely descended from a population represented by Early Bronze Age hunter-gatherers in the Baikal region, with only a limited contribution (≈7 %) of WSH ancestry. At the same time, however, mass spectrometry analysis of dental calculus provides direct protein evidence of bovine, sheep, and goat milk consumption in seven of nine individuals. No individuals showed molecular evidence of lactase persistence, and only one individual exhibited evidence of >10 % WSH ancestry, despite the presence of WSH populations in the nearby Altai-Sayan region for more than a millennium. Unlike the spread of Neolithic farming in Europe and the expansion of Bronze Age pastoralism on the Western steppe, our Results indicate that ruminant dairy pastoralism was adopted on the Eastern steppe by local hunter-gatherers through a process of cultural transmission and minimal genetic exchange with outside groups.

Keywords: paleogenomics | LC-MS/MS | dental calculus | β-lactoglobulin | ^{a}Á-S1-casein

Significance: Since the Bronze Age, pastoralism has been a dominant subsistence mode on the Western steppe, but the origins of this tradition on the Eastern steppe are poorly understood. Here we investigate a putative early pastoralist population in northern Mongolia and find that dairy production was established on the Eastern steppe by 1300 BCE. Milk proteins preserved in dental calculus indicate an early focus on Western domesticated ruminants rather than local species, but genetic ancestry analysis indicates minimal admixture with Western steppe herders, suggesting that dairy pastoralism was introduced through adoption by local hunter-gatherers rather than population replacement.

Zhang 2018

Jia-Fu Zhang & Robin Dennell, *The last of Asia conquered by Homo sapiens*. science **362** (2018), 992–993.

Excavation reveals the earliest human colonization of the Tibetan Plateau.

Over 3600 stone artifacts were found, of which 300 are in the lowest layer, and 200 in a middle layer of sands and gravels; the rest were found in the topmost layer of sand and silt. There are no obvious typological, technological, or morphological differences in the assemblages from each layer, and Zhang et al. argue that all the artifacts can be regarded as part of the same assemblage. They also argue that the

artifacts were primarily associated with the lowest layer but that geological processes such as freeze-thawing and gelifluction moved some of the artifacts upwards through the strata.

Nevertheless, the evidence from Nwya Devu that humans were living at 4600 m above sea level 30,000 to 40,000 years ago provides a graphic example of how successful our species has been as a colonizing animal.

ZHANG 2018

X. L. Zhang et al., *The earliest human occupation of the high-altitude Tibetan Plateau 40 thousand to 30 thousand years ago.* science **362** (2018), 1049–1051.

s362-1049-Supplement.pdf

X. L. Zhang, B. B. Ha, S. J. Wang, Z. J. Chen, J. Y. Ge, H. Long, W. He, W. Da, X. M. Nian, M. J. Yi, X. Y. Zhou, P. Q. Zhang, Y. S. Jin, O. Bar-Yosef, J. W. Olsen & X. Gao

The Tibetan Plateau is the highest and one of the most demanding environments ever inhabited by humans. We investigated the timing and mechanisms of its initial colonization at the Nwya Devu site, located nearly 4600 meters above sea level. This site, dating from 40,000 to 30,000 years ago, is the highest Paleolithic archaeological site yet identified globally. Nwya Devu has yielded an abundant blade tool assemblage, indicating hitherto-unknown capacities for the survival of modern humans who camped in this environment. This site deepens the history of the peopling of the "roof of the world" and the antiquity of human high-altitude occupations more generally.

Ozeanien

KEALY 2018

Shimona Kealy, Julien Louys & Sue O'Connor, *Least-cost pathway models indicate northern human dispersal from Sunda to Sahul.* Journal of Human Evolution **125** (2018), 59–70.

Archaeological records from Australia provide the earliest, indirect evidence for maritime crossings by early modern humans, as the islands to the north-west of the continent (Wallacea) have never been connected to the mainland. Suggested in 1977 by Joseph B. Birdsell, the two main routes from Sunda (mainland Southeast Asia) to Sahul (Australia-New Guinea), still in debate today, are a northern route through Sulawesi with a landing in New Guinea, or a southern route through Bali, Timor and thence landing in northern Australia. Here we construct least-cost pathway models of human dispersal from Sunda to Sahul at 65 ka and 70 ka by extending previous out-of-Africa least-cost models through the digitization of these routes. We recover overwhelming support for a northern route into Sahul, with a landing location on present-day Misool Island. Minimal support is also recovered for the southern route at 70 ka, with a possible crossing to Sahul from eastern Timor. Review of archaeological records on the Wallacean islands crossed by our northern route indicate a dearth of archaeological research in this region. Meanwhile, the comparatively better studied southern islands still lack any archaeological dates comparable to those known for initial occupation in Sunda and Sahul. Based on our model results we suggest Misool Island as the initial landing site for early modern humans on Sahul and recommend a future focus on archaeological fieldwork in the northern Wallacean islands.

Keywords: Wallacea | Early modern humans | Routes | Pleistocene | Paleogeography | Island Southeast Asia